

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 032168812PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2004/042997	International filing date (<i>day/month/year</i>) 21 December 2004 (21.12.2004)	Priority date (<i>day/month/year</i>) 22 December 2003 (22.12.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant THE REGENTS OF THE UNIVERSITY OF CALIFORNIA		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

<p style="text-align: center;">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. +41 22 338 82 70</p>	<p>Date of issuance of this report 26 June 2006 (26.06.2006)</p> <hr/> <p>Authorized officer Philippe Becamel</p> <p>e-mail: pt12@wipo.int</p>
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
STEVEN P. FALLON
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PCT

REC'D 18 JUL 2005

WRITTEN OPINION OF
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference

032168812PCT

Date of mailing
(day/month/year)

11 JUL 2005

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US04/42997

International filing date (day/month/year)

21 December 2004 (21.12.2004)

Priority date (day/month/year)

22 December 2003 (22.12.2003)

International Patent Classification (IPC) or both national classification and IPC

IPC(7): G06K 19/00; G01N 21/64 and US Cl.: 235/487; 436/056

Applicant

HE REGENTS OF THE UNIVERSITY OF CALIFORNIA

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US04/42997

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US04/42997

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>NONE</u>	YES
	Claims <u>1-41</u>	NO
Inventive step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-41</u>	NO
Industrial applicability (IA)	Claims <u>1-41</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and explanations:

Claims 1-41 lack novelty under PCT Article 33(2) as being anticipated by Sailor et al (WO 03/067231 A1).

Sailor et al teaches an optically encoded particle (10), comprising: a layer of material (any of layers or regions 12i-12n), porosity within the layer of material configured to produce an interference pattern in the reflectivity spectrum that forms an optical signature including a detectable grey scale code (see page 5, lines 21-23); wherein said porosity is formed in accordance with an etching waveform (see page 6, lines 3-10), and there is a correspondence between sine components of the etching waveform and a spectral position and height of peaks in Fourier transformed k-space of said interference spectrum (see page 7, lines 15-18); wherein the height of the spectral peaks correspond to sine components' amplitudes (see figure 2B); wherein said material comprises a silicon semiconductor (see page 8, lines 10-19); wherein the first layer and n additional layers are formed from an insulator (see figure 1 and page 8, lines 10-19); the particle comprising a receptor for a biological, chemical, gaseous analyte (see page 6, lines 20-23); a method for encoding thin films, comprising steps of: etching a semiconductor or insulator substrate to form a thin film including pores, varying etching conditions to vary porosity in the thin film according to a pattern that will generate an optical signature in the reflectivity spectrum in response to illumination, the optical signature including a grey scale code (see figures 3-4 and page 8, line 10 - page 9, line 24); wherein the step of varying comprises applying an etching waveform formed by the addition of at least two separate sine components (step 20, figure 4); a step of separating the film into particles (step 24, figure 4); a step of placing a particle within a host (step 28, figure 4); a method for identification of an analyte bound to an encoded particle, the method comprising steps of: associating the encoded particle with the analyte or host, generating an interference pattern in the reflectivity spectrum by illumination of the particle, determining the particle's code from the interference pattern, identifying the analyte or the host based upon said step of determining (see page 9, line 25 - page 10, line 3).

Claims 1-41 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US04/42997

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the questions whether the claims are fully supported by the description, are made:

Regarding claim 8, "said first porous layer" and "said n additional layers" lack proper antecedent basis.

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
14 July 2005 (14.07.2005)

PCT

(10) International Publication Number
WO 2005/062865 A3

(51) International Patent Classification⁷: **G06K 19/00**,
G01N 21/64

(21) International Application Number:
PCT/US2004/042997

(22) International Filing Date:
21 December 2004 (21.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/532,144 22 December 2003 (22.12.2003) US

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(72) Inventors; and

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

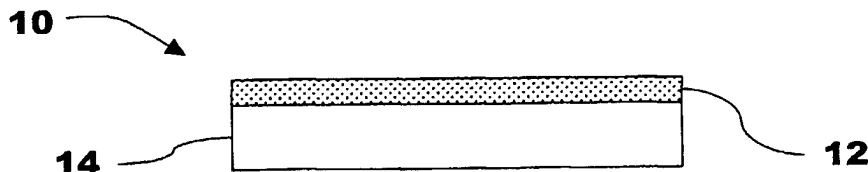
Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
1 September 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OPTICALLY ENCODED PARTICLES WITH GREY SCALE SPECTRA



(57) Abstract: The invention concerns a particle (10) having a grey scale code embedded in its physical structure by refractive index changes between different regions of the particle. The particle includes a porous thin film (12), having varying porosity, formed on a substrate (14).



WO 2005/062865 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/42997

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06K 19/00; G01N 21/64

US CL : 235/487; 436/056

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 235/487, 375; 436/056, 166; 422/058

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/067231 A1 (SAILOR et al) 04 August 2003 (04.08.2003), see entire document.	1-41
A	US 2003/0129778 A1 (BASTIAN et al) 10 July 2003 (10.07.2003), see figures 1, 3, 4, paragraphs 21-32 and 37-44.	1-41
A	US 6,465,193 B2 (AKESON et al) 15 October 2002 (15.10.2002), see figures 1, 4, column 3, line 65 - column 4, line 12.	1-41
A	US 6,248,539 B1 (GHADIRI et al) 19 June 2001 (19.06.2001), see entire document.	1-41

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

27 April 2005 (27.04.2005)

Date of mailing of the international search report

14 JUL 2005

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